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| 10/780,075 | 02/17/2004 | Matthias Goldbach | P2001,0273 | 9490 |
| 24131 | 7590 | 05/17/2006 | EXAMINER | |
| LERNER GREENBERG STEMER LLP | | | PHAM, HOAI V | |
| P O BOX 2480 | | | ART UNIT | PAPER NUMBER |
| HOLLYWOOD, FL 33022-2480 | | | 2814 | |

DATE MAILED: 05/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/780,075

Applicant(s)

GOLDBACH ET AL.

Examiner

Hoai v. Pham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 March 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) 1-7, 11 and 15-35 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8-10, 12-14 and 36-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☒ Certified copies of the priority documents have been received in Application No. 10/131,358.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 12 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The limitation "wherein the conductive layer is formed of a material selected from the group consisting of metal silicide, metal nitride, metal carbide, WN, WSiN, WC, TiN, TaN, and TaSiN" is not described in the specification.

3. Claim 12 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The limitation "wherein the conductive layer is formed of a material selected from the group consisting of metal silicide, metal nitride, metal carbide, WN, WSiN, WC, TiN, TaN, and TaSiN" is not enabled because the specification page 20 and figure 3 describe the conductive layer 11 formed by doping the silicon substrate with P and As.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 8-10, 14, 36-38 and 41 are rejected under 35 U.S.C. 102(e) as being anticipated by Sato et al. [U.S. Pat. 6,552,380] previously applied.

With respect to claim 8, Sato et al. (fig. 1D, cols. 5-6) discloses a storage capacitor, comprising:

- a lower capacitor electrode (in a substrate 1 not shown);
- a storage dielectric (5); and
- an upper capacitor electrode (6);

said lower capacitor electrode being a conductive layer;

a doped layer selected from the group consisting of a SiGe layer (7) disposed on a side of said conductive layer (6) remote from said storage dielectric (5); and

wherein a doped SiGe layer (7) is not disposed between said storage dielectric (5) and said upper capacitor electrode (6).

With respect to claim 9, Sato et al. (col. 1, lines 14-20) discloses that the storage capacitor configured to form a part of a DRAM memory cell.

With respect to claims 10 and 14, Sato et al. (col. 6, lines 1-13) discloses that the dopant distribution with a gradient for said SiGe layer is selected from the group consisting of B and P.

With respect to claim 36, Sato et al. (fig. 1D, cols. 5-6) discloses a storage capacitor, comprising:

- a substrate (1) having a trench (3) formed therein, said trench (3) having a bottom, an upper portion and a lower portion with sidewalls;

- a collar (4) disposed in said upper portion of said trench;

- a lower capacitor electrode (in the substrate 1 not shown);

- a storage dielectric (5) covering said lower portion of said trench and said collar;

- an upper capacitor electrode (6) being a conductive layer disposed at said sidewalls of said lower portion of said trench and at said bottom of said trench;

- a doped layer selected from the group consisting of a SiGe layer (7) disposed on a side of said conductive layer (6) remote from said storage dielectric (5); and

- said storage dielectric (5) and said upper capacitor electrode (6) having no doped SiGe layer (7) disposed therebetween.

With respect to claim 37, Sato et al. (col. 1, lines 14-20) discloses that the storage capacitor configured to form a part of a DRAM memory cell.

With respect to claims 38 and 41, Sato et al. (col. 6, lines 1-13) discloses that the dopant distribution with a gradient for said SiGe layer is selected from the group consisting of B and P.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 12-13 and 39-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. [U.S. Pat. 6,552,380] previously applied, in view of Hanttangady et al. [U.S. Pat. 6,335,238] previously applied.

Sato et al. substantially discloses all the limitations as claimed above except the conductive layer of the upper electrode is formed of a material selected from the group

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consisting of metal silicide, metal nitride, metal carbide, WN, WSiN, WC, TiN, TaN, and TaSiN and the storage dielectric contains a material selected from the group consisting of silicon nitride, silicon dioxide, silicon oxynitride, metal oxide, aluminum oxide, Pr_2O_3 , Nd_2O_3 , Al_2O_3 with an addition of Hf, Zr, Y or La. However, Hanttangady et al. discloses that these materials metal nitride (TiN) and metal oxide (Ta_2O_5), and their uses are well known in the art for forming the upper electrode (48) and the storage dielectric (46) respectively (see col. 6, lines 22-35). Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to select metal nitride (TiN) and metal oxide (Ta_2O_5) as known materials, as taught by Hanttangady et al., into the device of Sato et al. to form the upper electrode and the storage dielectric respectively since metal oxide (Ta_2O_5) would have high permittivity and metal nitride (TiN) would provide a better conductor. Moreover, selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co., Inc. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Response to Arguments

9. Applicant's arguments filed 03/02/2006 have been fully considered but they are not persuasive.

Applicant argues that neither Sato nor Hanttangady show or suggest a lower capacitor electrode being a conductive layer as recited in claim 8 and neither Sato nor Hanttangady show or suggest a doped layer or filling covering a storage dielectric at an upper portion of a trench as recited in claim 36.

Applicant's arguments are not persuasive because the lower capacitor electrode of Sato (not shown in the figure) is a conductive layer. Note that, if the lower capacitor electrode of Sato is not the conductive layer then the device of Sato will not work, thus the lower capacitor electrode of Sato must be the conductive layer in order to form the capacitor. Also, lower capacitor electrode (42) of Sato is a conductive layer. Sato also clearly discloses that a doped layer (7) or filling covering a storage dielectric (5) at an upper portion of a trench (3) (see fig. 1D).

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

11. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoai v. Pham whose telephone number is 571-272-1715. The examiner can normally be reached on M-F.

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13. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

14. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



HOAI PHAM
PRIMARY EXAMINER